

## SEQUENCE LISTING

<110> Splawski, Igor  
Keating, Mark T.

<120> ALTERATIONS IN THE LONG QT SYNDROME GENES KVLQT1 AND SCN5A AND METHODS FOR DETECTING SAME

<130> 2323-155

<140> Not yet assigned  
<141> 2000-08-09

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<151> 2000-03-17

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<170> PatentIn Ver. 2.0

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aag acc atc aag gtt ctg ctt gag tat gcc gac aag atg ttc aca tat Lys Thr Ile Lys Val Leu Leu Glu Tyr Ala Asp Lys Met Phe Thr Tyr 1235 1240 1245	3744
gtc ttc gtg ctg gag atg ctg ctc aag tgg gtg gcc tac ggc ttc aag Val Phe Val Leu Glu Met Leu Leu Lys Trp Val Ala Tyr Phe Lys 1250 1255 1260	3792
aag tac ttc acc aat gcc tgg tgc tgg ctc gac ttc ctc atc gta gac Lys Tyr Phe Thr Asn Ala Trp Cys Trp Leu Asp Phe Leu Ile Val Asp 1265 1270 1275 1280	3840
gtc tct ctg gtc agc ctg gtg gcc aac acc ctg ggc ttt gcc gag atg Val Ser Leu Val Ser Leu Val Ala Asn Thr Leu Gly Phe Ala Glu Met 1285 1290 1295	3888
ggc ccc atc aag tca ctg cgg acg ctg cgt gca ctc cgt cct ctg aga Gly Pro Ile Lys Ser Leu Arg Thr Leu Arg Ala Leu Arg Pro Leu Arg 1300 1305 1310	3936
gct ctg tca cga ttt gag ggc atg agg gtg gtg gtc aat gcc ctg gtg Ala Leu Ser Arg Phe Glu Gly Met Arg Val Val Asn Ala Leu Val 1315 1320 1325	3984
ggc gcc atc ccg tcc atc atg aac gtc ctc gtc tgc ctc atc ttc Gly Ala Ile Pro Ser Ile Met Asn Val Leu Val Cys Leu Ile Phe 1330 1335 1340	4032
tgg ctc atc ttc agc atc atg ggc gtg aac ctc ttt gcg ggg aag ttt Trp Leu Ile Phe Ser Ile Met Gly Val Asn Leu Phe Ala Gly Lys Phe 1345 1350 1355 1360	4080
ggg agg tgc atc aac cag aca gag gga gac ttg cct ttg aac tac acc Gly Arg Cys Ile Asn Gln Thr Glu Gly Asp Leu Pro Leu Asn Tyr Thr 1365 1370 1375	4128

atc gtg aac aac aag agc cag tgt gag tcc ttg aac ttg acc gga gaa Ile Val Asn Asn Lys Ser Gln Cys Glu Ser Leu Asn Leu Thr Gly Glu 1380 1385 1390	4176
ttg tac tgg acc aag gtg aaa gtc aac ttt gac aac gtg ggg gcc ggg Leu Tyr Trp Thr Lys Val Lys Val Asn Phe Asp Asn Val Gly Ala Gly 1395 1400 1405	4224
tac ctg gcc ctt ctg cag gtg gca aca ttt aaa ggc tgg atg gac att Tyr Leu Ala Leu Leu Gln Val Ala Thr Phe Lys Gly Trp Met Asp Ile 1410 1415 1420	4272
atg tat gca gct gtg gac tcc agg ggg tat gaa gag cag cct cag tgg Met Tyr Ala Ala Val Asp Ser Arg Gly Tyr Glu Glu Gln Pro Gln Trp 1425 1430 1435 1440	4320
gaa tac aac ctc tac atg tac atc tat ttt gtc att ttc atc atc ttt Glu Tyr Asn Leu Tyr Met Tyr Ile Tyr Phe Val Ile Phe Ile Ile Phe 1445 1450 1455	4368
ggg tct ttc ttc acc ctg aac ctc ttt att ggt gtc atc att gac aac Gly Ser Phe Phe Thr Leu Asn Leu Phe Ile Gly Val Ile Ile Asp Asn 1460 1465 1470	4416
ttc aac caa cag aag aaa aag tta ggg ggc cag gac atc ttc atg aca Phe Asn Gln Gln Lys Lys Leu Gly Gly Gln Asp Ile Phe Met Thr 1475 1480 1485	4464
gag gag cag aag aag tac tac aat gcc atg aag aag ctg ggc tcc aag Glu Glu Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys Leu Gly Ser Lys 1490 1495 1500	4512
aag ccc cag aag ccc atc cca cgg ccc ctg aac aag tac cag ggc ttc Lys Pro Gln Lys Pro Ile Pro Arg Pro Leu Asn Lys Tyr Gln Gly Phe 1505 1510 1515 1520	4560
ata ttc gac att gtg acc aag cag gcc ttt gac gtc acc atc atg ttt Ile Phe Asp Ile Val Thr Lys Gln Ala Phe Asp Val Thr Ile Met Phe 1525 1530 1535	4608
ctg atc tgc ttg aat atg gtg acc atg atg gtg gag aca gat gac caa Leu Ile Cys Leu Asn Met Val Thr Met Met Val Glu Thr Asp Asp Gln 1540 1545 1550	4656
agt cct gag aaa atc aac atc ttg gcc aag atc aac ctg ctc ttt gtg Ser Pro Glu Lys Ile Asn Ile Leu Ala Lys Ile Asn Leu Leu Phe Val 1555 1560 1565	4704
gcc atc ttc aca ggc gag tgt att gtc aag ctg gct gcc ctg cgc cac Ala Ile Phe Thr Gly Glu Cys Ile Val Lys Leu Ala Ala Leu Arg His 1570 1575 1580	4752
tac tac ttc acc aac agc tgg aat atc ttc gac ttc gtg gtt gtc atc Tyr Tyr Phe Thr Asn Ser Trp Asn Ile Phe Asp Phe Val Val Val Ile 1585 1590 1595 1600	4800
ctc tcc atc gtg ggc act gtg ctc tcg gac atc atc cag aag tac ttc Leu Ser Ile Val Gly Thr Val Leu Ser Asp Ile Ile Gln Lys Tyr Phe 1605 1610 1615	4848
ttc tcc ccg acg ctc ttc cga gtc atc cgc ctg gcc cga ata ggc cgc Phe Ser Pro Thr Leu Phe Arg Val Ile Arg Leu Ala Arg Ile Gly Arg 1620 1625 1630	4896

atc ctc aga ctg atc cga ggg gcc aag ggg atc cgc acg ctg ctc ttt Ile Leu Arg Leu Ile Arg Gly Ala Lys Gly Ile Arg Thr Leu Leu Phe 1635 1640 1645	4944
gcc ctc atg atg tcc ctg cct gcc ctc ttc aac atc ggg ctg ctg ctc Ala Leu Met Met Ser Leu Pro Ala Leu Phe Asn Ile Gly Leu Leu Leu 1650 1655 1660	4992
ttc ctc gtc atg ttc atc tac tcc atc ttt ggc atg gcc aac ttc gct Phe Leu Val Met Phe Ile Tyr Ser Ile Phe Gly Met Ala Asn Phe Ala 1665 1670 1675 1680	5040
tat gtc aag tgg gag gct ggc atc gac gac atg ttc aac ttc cag acc Tyr Val Lys Trp Glu Ala Gly Ile Asp Asp Met Phe Asn Phe Gln Thr 1685 1690 1695	5088
ttc gcc aac agc atg ctg tgc ctc ttc cag atc acc acg tcc gcc ggc Phe Ala Asn Ser Met Leu Cys Leu Phe Gln Ile Thr Thr Ser Ala Gly 1700 1705 1710	5136
tgg gat ggc ctc ctc agc ccc atc ctc aac act ggg ccg ccc tac tgc Trp Asp Gly Leu Leu Ser Pro Ile Leu Asn Thr Gly Pro Pro Tyr Cys 1715 1720 1725	5184
gac ccc act ctg ccc aac agc aat ggc tct cgg ggg gac tgc ggg agc Asp Pro Thr Leu Pro Asn Ser Asn Gly Ser Arg Gly Asp Cys Gly Ser 1730 1735 1740	5232
cca gcc gtg ggc atc ctc ttc acc acc tac atc atc atc tcc ttc Pro Ala Val Gly Ile Leu Phe Phe Thr Thr Tyr Ile Ile Ser Phe 1745 1750 1755 1760	5280
ctc atc gtg gtc aac atg tac att gcc atc atc ctg gag aac ttc agc Leu Ile Val Val Asn Met Tyr Ile Ala Ile Ile Leu Glu Asn Phe Ser 1765 1770 1775	5328
gtg gcc acg gag gag agc acc gag ccc ctg agt gag gac gac ttc gat Val Ala Thr Glu Glu Ser Thr Glu Pro Leu Ser Glu Asp Asp Phe Asp 1780 1785 1790	5376
atg ttc tat gag atc tgg gag aaa ttt gac cca gag gcc act cag ttt Met Phe Tyr Glu Ile Trp Glu Lys Phe Asp Pro Glu Ala Thr Gln Phe 1795 1800 1805	5424
att gag tat tcg gtc ctg tct gac ttt gcc gac gcc ctg tct gag cca Ile Glu Tyr Ser Val Leu Ser Asp Phe Ala Asp Ala Leu Ser Glu Pro 1810 1815 1820	5472
ctc cgt atc gcc aag ccc aac cag ata agc ctc atc aac atg gac ctg Leu Arg Ile Ala Lys Pro Asn Gln Ile Ser Leu Ile Asn Met Asp Leu 1825 1830 1835 1840	5520
ccc atg gtg agt ggg gac cgc atc cat tgc atg gac att ctc ttt gcc Pro Met Val Ser Gly Asp Arg Ile His Cys Met Asp Ile Leu Phe Ala 1845 1850 1855	5568
ttc acc aaa agg gtc ctg ggg gag tct ggg gag atg gac gcc ctg aag Phe Thr Lys Arg Val Leu Gly Glu Ser Gly Glu Met Asp Ala Leu Lys 1860 1865 1870	5616
atc cag atg gag gag aag ttc atg gca gcc aac cca tcc aag atc tcc Ile Gln Met Glu Glu Lys Phe Met Ala Ala Asn Pro Ser Lys Ile Ser 1875 1880 1885	5664

tac gag ccc atc acc acc aca ctc cgg cgc aag cac gaa gag gtg tcg Tyr Glu Pro Ile Thr Thr Leu Arg Arg Lys His Glu Glu Val Ser 1890 1895 1900	5712
gcc atg gtt atc cag aga gcc ttc cgc agg cac ctg ctg caa cgc tct Ala Met Val Ile Gln Arg Ala Phe Arg Arg His Leu Leu Gln Arg Ser 1905 1910 1915 1920	5760
ttg aag cat gcc tcc ttc ctc cgt cag cag gcg ggc agc ggc ctc Leu Lys His Ala Ser Phe Leu Phe Arg Gln Gln Ala Gly Ser Gly Leu 1925 1930 1935	5808
tcc gaa gag gat gcc cct gag cga gag ggc ctc atc gcc tac gtg atg Ser Glu Glu Asp Ala Pro Glu Arg Glu Gly Leu Ile Ala Tyr Val Met 1940 1945 1950	5856
agt gag aac ttc tcc cga ccc ctt ggc cca ccc tcc agc tcc tcc atc Ser Glu Asn Phe Ser Arg Pro Leu Gly Pro Pro Ser Ser Ser Ile 1955 1960 1965	5904
tcc tcc act tcc ttc cca ccc tcc tat gac agt gtc act aga gcc acc Ser Ser Thr Ser Phe Pro Pro Ser Tyr Asp Ser Val Thr Arg Ala Thr 1970 1975 1980	5952
agc gat aac ctc cag gtg cgg ggg tct gac tac agc cac agt gaa gat Ser Asp Asn Leu Gln Val Arg Gly Ser Asp Tyr Ser His Ser Glu Asp 1985 1990 1995 2000	6000
ctc gcc gac ttc ccc cct tct ccg gac agg gac cgt gag tcc atc gtg Leu Ala Asp Phe Pro Pro Ser Pro Asp Arg Asp Arg Glu Ser Ile Val 2005 2010 2015	6048

&lt;210&gt; 4

&lt;211&gt; 2016

&lt;212&gt; PRT

&lt;213&gt; Homo sapiens

&lt;400&gt; 4

Met Ala Asn Phe Leu Leu Pro Arg Gly Thr Ser Ser Phe Arg Arg Phe  
1 5 10 15Thr Arg Glu Ser Leu Ala Ala Ile Glu Lys Arg Met Ala Glu Lys Gln  
20 25 30Ala Arg Gly Ser Thr Thr Leu Gln Glu Ser Arg Glu Gly Leu Pro Glu  
35 40 45Glu Glu Ala Pro Arg Pro Gln Leu Asp Leu Gln Ala Ser Lys Lys Leu  
50 55 60Pro Asp Leu Tyr Gly Asn Pro Pro Gln Glu Leu Ile Gly Glu Pro Leu  
65 70 75 80Glu Asp Leu Asp Pro Phe Tyr Ser Thr Gln Lys Thr Phe Ile Val Leu  
85 90 95Asn Lys Gly Lys Thr Ile Phe Arg Phe Ser Ala Thr Asn Ala Leu Tyr  
100 105 110Val Leu Ser Pro Phe His Pro Val Arg Arg Ala Ala Val Lys Ile Leu  
115 120 125

Val His Ser Leu Phe Asn Met Leu Ile Met Cys Thr Ile Leu Thr Asn  
 130 135 140  
 Cys Val Phe Met Ala Gln His Asp Pro Pro Pro Trp Thr Lys Tyr Val  
 145 150 155 160  
 Glu Tyr Thr Phe Thr Ala Ile Tyr Thr Phe Glu Ser Leu Val Lys Ile  
 165 170 175  
 Leu Ala Arg Ala Phe Cys Leu His Ala Phe Thr Phe Leu Arg Asp Pro  
 180 185 190  
 Trp Asn Trp Leu Asp Phe Ser Val Ile Ile Met Ala Tyr Thr Thr Glu  
 195 200 205  
 Phe Val Asp Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu  
 210 215 220  
 Arg Ala Leu Lys Thr Ile Ser Val Ile Ser Gly Leu Lys Thr Ile Val  
 225 230 235 240  
 Gly Ala Leu Ile Gln Ser Val Lys Lys Leu Ala Asp Val Met Val Leu  
 245 250 255  
 Thr Val Phe Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe  
 260 265 270  
 Met Gly Asn Leu Arg His Lys Cys Val Arg Asn Phe Thr Ala Leu Asn  
 275 280 285  
 Gly Thr Asn Gly Ser Val Glu Ala Asp Gly Leu Val Trp Glu Ser Leu  
 290 295 300  
 Asp Leu Tyr Leu Ser Asp Pro Glu Asn Tyr Leu Leu Lys Asn Gly Thr  
 305 310 315 320  
 Ser Asp Val Leu Leu Cys Gly Asn Ser Ser Asp Ala Gly Thr Cys Pro  
 325 330 335  
 Glu Gly Tyr Arg Cys Leu Lys Ala Gly Glu Asn Pro Asp His Gly Tyr  
 340 345 350  
 Thr Ser Phe Asp Ser Phe Ala Trp Ala Phe Leu Ala Leu Phe Arg Leu  
 355 360 365  
 Met Thr Gln Asp Cys Trp Glu Arg Leu Tyr Gln Gln Thr Leu Arg Ser  
 370 375 380  
 Ala Gly Lys Ile Tyr Met Ile Phe Phe Met Leu Val Ile Phe Leu Gly  
 385 390 395 400  
 Ser Phe Tyr Leu Val Asn Leu Ile Leu Ala Val Val Ala Met Ala Tyr  
 405 410 415  
 Glu Glu Gln Asn Gln Ala Thr Ile Ala Glu Thr Glu Glu Lys Glu Lys  
 420 425 430  
 Arg Phe Gln Glu Ala Met Glu Met Leu Lys Lys Glu His Glu Ala Leu  
 435 440 445  
 Thr Ile Arg Gly Val Asp Thr Val Ser Arg Ser Ser Leu Glu Met Ser  
 450 455 460

Pro Leu Ala Pro Val Asn Ser His Glu Arg Arg Ser Lys Arg Arg Lys  
 465 470 475 480  
 Arg Met Ser Ser Gly Thr Glu Glu Cys Gly Glu Asp Arg Leu Pro Lys  
 485 490 495  
 Ser Asp Ser Glu Asp Gly Pro Arg Ala Met Asn His Leu Ser Leu Thr  
 500 505 510  
 Arg Gly Leu Ser Arg Thr Ser Met Lys Pro Arg Ser Ser Arg Gly Ser  
 515 520 525  
 Ile Phe Thr Phe Arg Arg Arg Asp Leu Gly Ser Glu Ala Asp Phe Ala  
 530 535 540  
 Asp Asp Glu Asn Ser Thr Ala Arg Glu Ser Glu Ser His His Thr Ser  
 545 550 555 560  
 Leu Leu Val Pro Trp Pro Leu Arg Arg Thr Ser Ala Gln Gly Gln Pro  
 565 570 575  
 Ser Pro Gly Thr Ser Ala Pro Gly His Ala Leu His Gly Lys Lys Asn  
 580 585 590  
 Ser Thr Val Asp Cys Asn Gly Val Val Ser Leu Leu Gly Ala Gly Asp  
 595 600 605  
 Pro Glu Ala Thr Ser Pro Gly Ser His Leu Leu Arg Pro Val Met Leu  
 610 615 620  
 Glu His Pro Pro Asp Thr Thr Thr Pro Ser Glu Glu Pro Gly Gly Pro  
 625 630 635 640  
 Gln Met Leu Thr Ser Gln Ala Pro Cys Val Asp Gly Phe Glu Glu Pro  
 645 650 655  
 Gly Ala Arg Gln Arg Ala Leu Ser Ala Val Ser Val Leu Thr Ser Ala  
 660 665 670  
 Leu Glu Glu Leu Glu Glu Ser Arg His Lys Cys Pro Pro Cys Trp Asn  
 675 680 685  
 Arg Leu Ala Gln Arg Tyr Leu Ile Trp Glu Cys Cys Pro Leu Trp Met  
 690 695 700  
 Ser Ile Lys Gln Gly Val Lys Leu Val Val Met Asp Pro Phe Thr Asp  
 705 710 715 720  
 Leu Thr Ile Thr Met Cys Ile Val Leu Asn Thr Leu Phe Met Ala Leu  
 725 730 735  
 Glu His Tyr Asn Met Thr Ser Glu Phe Glu Glu Met Leu Gln Val Gly  
 740 745 750  
 Asn Leu Val Phe Thr Gly Ile Phe Thr Ala Glu Met Thr Phe Lys Ile  
 755 760 765  
 Ile Ala Leu Asp Pro Tyr Tyr Phe Gln Gln Gly Trp Asn Ile Phe  
 770 775 780  
 Asp Ser Ile Ile Val Ile Leu Ser Leu Met Glu Leu Gly Leu Ser Arg  
 785 790 795 800

Met Ser Asn Leu Ser Val Leu Arg Ser Phe Arg Leu Leu Arg Val Phe  
                   805                      810                      815  
 Lys Leu Ala Lys Ser Trp Pro Thr Leu Asn Thr Leu Ile Lys Ile Ile  
                   820                      825                      830  
 Gly Asn Ser Val Gly Ala Leu Gly Asn Leu Thr Leu Val Leu Ala Ile  
                   835                      840                      845  
 Ile Val Phe Ile Phe Ala Val Val Gly Met Gln Leu Phe Gly Lys Asn  
                   850                      855                      860  
 Tyr Ser Glu Leu Arg Asp Ser Asp Ser Gly Leu Leu Pro Arg Trp His  
                   865                      870                      875                      880  
 Met Met Asp Phe Phe His Ala Phe Leu Ile Ile Phe Arg Ile Leu Cys  
                   885                      890                      895  
 Gly Glu Trp Ile Glu Thr Met Trp Asp Cys Met Glu Val Ser Gly Gln  
                   900                      905                      910  
 Ser Leu Cys Leu Leu Val Phe Leu Leu Val Met Val Ile Gly Asn Leu  
                   915                      920                      925  
 Val Val Leu Asn Leu Phe Leu Ala Leu Leu Leu Ser Ser Phe Ser Ala  
                   930                      935                      940  
 Asp Asn Leu Thr Ala Pro Asp Glu Asp Arg Glu Met Asn Asn Leu Gln  
                   945                      950                      955                      960  
 Leu Ala Leu Ala Arg Ile Gln Arg Gly Leu Arg Phe Val Lys Arg Thr  
                   965                      970                      975  
 Thr Trp Asp Phe Cys Cys Gly Leu Leu Arg His Arg Pro Gln Lys Pro  
                   980                      985                      990  
 Ala Ala Leu Ala Ala Gln Gly Gln Leu Pro Ser Cys Ile Ala Thr Pro  
                   995                      1000                      1005  
 Tyr Ser Pro Pro Pro Pro Glu Thr Glu Lys Val Pro Pro Thr Arg Lys  
                   1010                      1015                      1020  
 Glu Thr Gln Phe Glu Glu Gly Glu Gln Pro Gly Gln Gly Thr Pro Gly  
                   1025                      1030                      1035                      1040  
 Asp Pro Glu Pro Val Cys Val Pro Ile Ala Val Ala Glu Ser Asp Thr  
                   1045                      1050                      1055  
 Asp Asp Gln Glu Glu Asp Glu Glu Asn Ser Leu Gly Thr Glu Glu Glu  
                   1060                      1065                      1070  
 Ser Ser Lys Gln Gln Glu Ser Gln Pro Val Ser Gly Trp Pro Arg Gly  
                   1075                      1080                      1085  
 Pro Pro Asp Ser Arg Thr Trp Ser Gln Val Ser Ala Thr Ala Ser Ser  
                   1090                      1095                      1100  
 Glu Ala Glu Ala Ser Ala Ser Gln Ala Asp Trp Arg Gln Gln Trp Lys  
                   1105                      1110                      1115                      1120  
 Ala Glu Pro Gln Ala Pro Gly Cys Gly Glu Thr Pro Glu Asp Ser Cys  
                   1125                      1130                      1135

Ser Glu Gly Ser Thr Ala Asp Met Thr Asn Thr Ala Glu Leu Leu Glu  
 1140 1145 1150  
 Gln Ile Pro Asp Leu Gly Gln Asp Val Lys Asp Pro Glu Asp Cys Phe  
 1155 1160 1165  
 Thr Glu Gly Cys Val Arg Arg Cys Pro Cys Cys Ala Val Asp Thr Thr  
 1170 1175 1180  
 Gln Ala Pro Gly Lys Val Trp Trp Arg Leu Arg Lys Thr Cys Tyr His  
 1185 1190 1195 1200  
 Ile Val Glu His Ser Trp Phe Glu Thr Phe Ile Ile Phe Met Ile Leu  
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 Leu Ser Ser Gly Ala Leu Ala Phe Glu Asp Ile Tyr Leu Glu Glu Arg  
 1220 1225 1230  
 Lys Thr Ile Lys Val Leu Leu Glu Tyr Ala Asp Lys Met Phe Thr Tyr  
 1235 1240 1245  
 Val Phe Val Leu Glu Met Leu Leu Lys Trp Val Ala Tyr Gly Phe Lys  
 1250 1255 1260  
 Lys Tyr Phe Thr Asn Ala Trp Cys Trp Leu Asp Phe Leu Ile Val Asp  
 1265 1270 1275 1280  
 Val Ser Leu Val Ser Leu Val Ala Asn Thr Leu Gly Phe Ala Glu Met  
 1285 1290 1295  
 Gly Pro Ile Lys Ser Leu Arg Thr Leu Arg Ala Leu Arg Pro Leu Arg  
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 Ala Leu Ser Arg Phe Glu Gly Met Arg Val Val Asn Ala Leu Val  
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 Trp Leu Ile Phe Ser Ile Met Gly Val Asn Leu Phe Ala Gly Lys Phe  
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 Tyr Leu Ala Leu Leu Gln Val Ala Thr Phe Lys Gly Trp Met Asp Ile  
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 Met Tyr Ala Ala Val Asp Ser Arg Gly Tyr Glu Glu Gln Pro Gln Trp  
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 Glu Tyr Asn Leu Tyr Met Tyr Ile Tyr Phe Val Ile Phe Ile Ile Phe  
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 Gly Ser Phe Phe Thr Leu Asn Leu Phe Ile Gly Val Ile Ile Asp Asn  
 1460 1465 1470

Phe Asn Gln Gln Lys Lys Leu Gly Gly Gln Asp Ile Phe Met Thr  
 1475 1480 1485  
 Glu Glu Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys Leu Gly Ser Lys  
 1490 1495 1500  
 Lys Pro Gln Lys Pro Ile Pro Arg Pro Leu Asn Lys Tyr Gln Gly Phe  
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 Ile Phe Asp Ile Val Thr Lys Gln Ala Phe Asp Val Thr Ile Met Phe  
 1525 1530 1535  
 Leu Ile Cys Leu Asn Met Val Thr Met Met Val Glu Thr Asp Asp Gln  
 1540 1545 1550  
 Ser Pro Glu Lys Ile Asn Ile Leu Ala Lys Ile Asn Leu Leu Phe Val  
 1555 1560 1565  
 Ala Ile Phe Thr Gly Glu Cys Ile Val Lys Leu Ala Ala Leu Arg His  
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 Tyr Tyr Phe Thr Asn Ser Trp Asn Ile Phe Asp Phe Val Val Val Ile  
 1585 1590 1595 1600  
 Leu Ser Ile Val Gly Thr Val Leu Ser Asp Ile Ile Gln Lys Tyr Phe  
 1605 1610 1615  
 Phe Ser Pro Thr Leu Phe Arg Val Ile Arg Leu Ala Arg Ile Gly Arg  
 1620 1625 1630  
 Ile Leu Arg Leu Ile Arg Gly Ala Lys Gly Ile Arg Thr Leu Leu Phe  
 1635 1640 1645  
 Ala Leu Met Met Ser Leu Pro Ala Leu Phe Asn Ile Gly Leu Leu Leu  
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 1665 1670 1675 1680  
 Tyr Val Lys Trp Glu Ala Gly Ile Asp Asp Met Phe Asn Phe Gln Thr  
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 Phe Ala Asn Ser Met Leu Cys Leu Phe Gln Ile Thr Thr Ser Ala Gly  
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 Pro Ala Val Gly Ile Leu Phe Phe Thr Thr Tyr Ile Ile Ile Ser Phe  
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 1765 1770 1775  
 Val Ala Thr Glu Glu Ser Thr Glu Pro Leu Ser Glu Asp Asp Phe Asp  
 1780 1785 1790  
 Met Phe Tyr Glu Ile Trp Glu Lys Phe Asp Pro Glu Ala Thr Gln Phe  
 1795 1800 1805

Ile Glu Tyr Ser Val Leu Ser Asp Phe Ala Asp Ala Leu Ser Glu Pro  
1810 1815 1820

Leu Arg Ile Ala Lys Pro Asn Gln Ile Ser Leu Ile Asn Met Asp Leu  
1825 1830 1835 1840

Pro Met Val Ser Gly Asp Arg Ile His Cys Met Asp Ile Leu Phe Ala  
1845 1850 1855

Phe Thr Lys Arg Val Leu Gly Glu Ser Gly Glu Met Asp Ala Leu Lys  
1860 1865 1870

Ile Gln Met Glu Glu Lys Phe Met Ala Ala Asn Pro Ser Lys Ile Ser  
1875 1880 1885

Tyr Glu Pro Ile Thr Thr Leu Arg Arg Lys His Glu Glu Val Ser  
1890 1895 1900

Ala Met Val Ile Gln Arg Ala Phe Arg Arg His Leu Leu Gln Arg Ser  
1905 1910 1915 1920

Leu Lys His Ala Ser Phe Leu Phe Arg Gln Gln Ala Gly Ser Gly Leu  
1925 1930 1935

Ser Glu Glu Asp Ala Pro Glu Arg Glu Gly Leu Ile Ala Tyr Val Met  
1940 1945 1950

Ser Glu Asn Phe Ser Arg Pro Leu Gly Pro Pro Ser Ser Ser Ile  
1955 1960 1965

Ser Ser Thr Ser Phe Pro Pro Ser Tyr Asp Ser Val Thr Arg Ala Thr  
1970 1975 1980

Ser Asp Asn Leu Gln Val Arg Gly Ser Asp Tyr Ser His Ser Glu Asp  
1985 1990 1995 2000

Leu Ala Asp Phe Pro Pro Ser Pro Asp Arg Asp Arg Glu Ser Ile Val  
2005 2010 2015